Remarks

Rejection of Claims 1-45 under 35 U.S.C. 103(a)

Claims 1-45 rejected under 35 U.S.C. 103(a) as being unpatentable over Breeden, US Patent 6,755,625, in view of French, US Patent 4,462,566.

The examiner states:

> Breeden teaches all the limitations of applicant's claims except the detail of the closed-ended spool valve. The Breeden valve, of course, functions the same of applicant's pressure-balanced valve in that the position of the valve is only dependent upon the spring pressure and the control pressure. The housing of the valve supplies the closed portion missing from the valve itself and acts to isolate the valve from the fluid flow pressure by having this pressure create no net movement of the valve.
>
> French teaches a valve (19), which essentially has two closed ends - even though one end moves relative to the other. The position of the valve however is only dependent upon the pilot pressure and the spring pressure balance.
>
> It would have been obvious to use a closed-ended spool in Breeden to achieve the required fluid balance because French suggests that a closed-ended spool could be used to avoid the effects of pressure from the regulated fluid.

Applicants respectfully submit that the claims patentably distinguish over the art of record.

Independent claim 1 is drawn to a system for regulating the flow of working fluid to a high-pressure pump supplying pressurized working fluid for a fuel injection system of an internal combustion engine. The system includes a body, an inlet throttle valve in the body, an inlet passage in fluid communication with the inlet

throttle valve to flow low-pressure working fluid to the valve, and an outlet passage in fluid communication with the inlet throttle valve to flow working fluid from the inlet throttle valve to the pump.

The throttle valve includes a bore in the body and a spool in the bore. The bore has a wall extending between ends of the bore. The spool is axially movable along the bore to regulate flow of fluid through the valve. The spool has axially opposed closed ends and a cylindrical wall extending between the ends, with inlet and outlet openings extending through the spool wall for flowing working fluid into and out of the spool.

The inlet passage includes a first opening in the bore wall in registration with the spool inlet opening to flow fluid from the inlet passage into the spool. The outlet passage includes a second opening in the bore wall in registration with the spool outlet opening to flow working fluid from the spool into the outlet passage.

Independent claim 23 is drawn to a pilot-controlled inlet throttle valve assembly for controlling the flow of working fluid to a high-pressure pump pressurizing the working fluid of a fuel injection system of a motor vehicle engine. The assembly includes a body, an inlet throttle valve in the body, and inlet and outlet passages to flow fluid to and from the inlet throttle valve.

The inlet throttle valve includes a bore in the body and a hollow piston in the bore. The bore has a wall extending between

its ends. The piston is slideable in the bore to control the flow of fluid through the valve. The inlet passage includes a first opening in the bore wall and the outlet passage includes a second opening in the bore wall.

The piston includes axially opposed closed ends, an outer surface surrounding the interior of the piston, a flow passage extending through the interior of the piston between the ends of the piston, and a valving edge opening and closing the flow passage with movement of the piston. The flow passage is in fluid communication with the first and second openings to flow fluid through the valve.

Independent claim 37 is drawn to a method of regulating the flow of working fluid to a high-pressure pump in a fuel injection system of an internal combustion engine. The method includes the step of providing an inlet throttle valve and a fluid passage from the inlet throttle valve to the pump.

The inlet throttle valve includes a flow passage to flow fluid through the inlet throttle valve to the fluid passage and a hollow piston having an outer surface obstructing the flow passage, the flow passage extending through the outer surface to flow fluid through the piston.

The method further includes the step of flowing working fluid through the flow passage and the interior of the piston to flow fluid through the inlet throttle valve and to the high-pressure pump.

French discloses a hydraulic circuit extending through an integral body formed from a valve block 20, a retainer cap 50, and a tubular valve casing 46. The valve casing is threaded to the retainer cap and the retainer cap is threaded to the valve block to form the body (see Figure 2). The hydraulic circuit has an inlet 45 and an outlet 50 to flow fluid into and out of the body.

A pressure compensator valve 19 is located in the hydraulic circuit. The valve 19 includes a bore having a bore wall formed by the inner wall of the valve casing 46. The bore wall has first inlet openings 47 to flow fluid into the valve and second outlet openings 49 to flow fluid out of the valve.

A spool 53 is movable in the bore to open and close openings 47, 49. The spool includes a pair of axially-spaced front and rear pistons connected by a smaller diameter axial piston rod. The piston rod rigidly joins the pistons together for conjoint movement along the bore wall.

Fluid flows through inlet opening 47 into the annular volume between the piston rod and the bore wall. The outer edge of the front piston valves the inlet opening 47 and the outer edge of the rear piston valves the outlet opening 49 to regulate flow through the valve.

The examiner states it would have been obvious to use a closed-ended spool in Breeden to achieve the required fluid balance because French suggests that a closed-ended spool could be used to avoid the effects of pressure from the regulated fluid. Applicant

disagrees and respectfully submits that the Breeden and French references do not establish a *prima facie* showing of obviousness, because the proposed combination, even if it could be made, would not meet the limitations of applicants' claims.

A proper Section 103 rejection must be based on a *prima facie* showing that it would have been obvious to a person of ordinary skill to combine the references. One of the elements to establish a *prima facie* showing of obviousness is that the combination of prior art reference must teach or suggest all the claim limitations. See MPEP §§ 706.02(j), 2142.

The proposed combination by the examiner does not meet the requirement for a *prima facia* showing of obviousness required to maintain a Section 103 rejection. Even assuming for argument a motivation to combine the Breeden and French references and that such combination was possible, the combination would not teach or suggest all the claim limitations.

Claim 1 recites that the inlet throttle valve has a spool having axially opposed closed ends and a cylindrical wall extending between the ends, with inlet and outlet openings extending through the spool wall for flowing working fluid into and out of the spool (emphasis added).

French does not teach or suggest a spool having inlet and outlet openings extending through the spool wall as recited in claim 1. Instead, French discloses a spool having spaced apart

pistons. Fluid flows into the space between the pistons without flowing through a spool wall.

Claim 23 recites that the inlet throttle valve has a piston that includes axially opposed closed ends, an outer surface surrounding the interior of the piston, and a flow passage extending through the interior of the piston between the ends of the piston in fluid communication with the first and second openings (emphasis added).

French does not teach or suggest that the spool have an outer surface surrounding the interior of the piston and a flow passage extending through the interior of the piston as recited in claim 37. Instead, French discloses a spool having two spaced-apart pistons. Fluid flows between two spaced-apart pistons and does not flow through an interior surrounded by an outer surface of the piston.

Claim 37 recites that the inlet throttle valve have a hollow piston having an outer surface obstructing the flow passage, the flow passage extending through the outer surface to flow fluid through the piston (emphasis added).

French does not teach or suggest a hollow piston having an outer surface obstructing the flow passage, the flow passage extending through the outer surface to flow fluid through the piston. Instead, French discloses a spool having two spaced-apart pistons. A flow passage is defined by the gap between the two

pistons but does not extend through the outer surface of a hollow piston.

Based on the foregoing, the combination of Breeden and French references does not teach or suggest all the claim limitations recited in independent claims 1, 23, and 37. A proper Section 103 rejection not being made out, withdrawal of the rejection and allowance of claims 1, 23, and 37 are respectfully requested. Claims 2-22, 24-36 and 38-45 depend from allowable claims and are thus allowable.

Conclusion

Applicants submit that the application is in condition for formal allowance. . Such action is solicited.

In the event issues remain, the Examiner is invited to contact applicants' attorney by telephone to resolve same.

Respectfully submitted,

ROBERT H. BREEDEN
PETER H. SHEPPARD
MARK A. STERRETT

By _____

Jeffrey S. Habib, Esq.
Attorney of Record
Reg. No. 42,615

Hooker & Habib, P.C.
100 Chestnut St., Ste. 304
Harrisburg, PA 17101
(717) 232-8771